

In the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1- 14 (Canceled)

15. (Currently Amended) A method for real time virtual positioning of a sound source in three dimensional space as perceived during playback with respect to a plurality of listening positions, comprising the steps of:

5 processing a non-binauralized input sound signal representing the sound source to provide a plurality of sound signals each representing the sound source, each of the plurality of sound signals corresponding to one of a plurality virtual of virtual locations disposed in an azimuthal plane with respect to a central listening position;

10 repositioning ~~in real time~~ select ones of the plurality of virtual locations to apparent positions above and below the azimuthal plane ~~to maintain constant virtual distances between the listening position and each of the plurality of virtual locations responsive to movement of the listening position, such that the perceived virtual locations of the sound signals do not vary with movement of the listening position;~~

15 mixing the plurality of sound signals including the sound signals corresponding to the repositioned select ones of the plurality of virtual locations, to provide a binauralized output including a left output signal and a right output signal; and

playing the left and right output signals through respective left and right loudspeakers ~~of a localized speaker headset~~ localized speaker headsets at the plurality of listening position: positions, wherein the left and right output signals provides a sound source at each of the plurality of listening positions appearing to have a constant virtual distance between the central listening position and each of the plurality of virtual locations.

16. (Canceled)

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17. (Previously Presented) The method of Claim 15, wherein the step of processing the non-binauralized input sound signal comprises the steps of:

selecting portions of each channel of the non-binauralized input sound signal;

blending the selected portions according to a predetermined mixing plan to generate a

5 composite sound signal; and

coupling the composite signal to an external loudspeaker.

18. (Original) The method of Claim 15, wherein the step of playing comprises the steps of:
supporting the left and right loudspeakers proximately in the plane of the zygomatic arch
of the listener in rearward facing relationship with respect to the listener's head for radiating sound
toward the pinna of the listener's respective left and right ears; and

5 coupling the left and right output signals to corresponding left and right signal inputs of
the localized speaker headset.

19. (Original) The method of Claim 18, wherein the step of supporting comprises the step
of:

locating the left and right loudspeakers proximate and not in contact with the respective
left and right ears of the listener so as to avoid disturbing the conch resonance of the listener's ears.

20. (Original) The method of Claim 18, wherein the step of supporting comprises the step
of:

5 locating the left and right loudspeakers proximate and not in contact with the respective
left and right ears of the listener such that the natural left-right and right-left separation of signals by the
listener's head is maintained.

21. (Original) The method of Claim 15, comprising the step of:

associating a video image with the non-binauralized input sound signal.

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22. (Original) The method of Claim 21, wherein the step of associating a video image comprises the steps of:

associating an external loudspeaker with the video image;

positioning the external loudspeaker proximate the video image and facing in the same
5 direction as a line of sight from the central portion of the video image to the listener; and

reproducing a portion of the non-binauralized input sound signal in the external
loudspeaker.

23. (Original) The method of Claim 22, wherein the step of reproducing comprises the steps
of:

selecting portions of each channel of the non-binauralized input sound signal;

blending the selected portions according to a predetermined mixing plan to generate a
5 composite sound signal; and

coupling the composite sound signal to the external loudspeaker.

24. (Original) The method of Claim 22, wherein the portion of the non-binauralized input
sound signal reproduced by the external loudspeaker comprises voice sounds.

25. (Original) The method of Claim 22, wherein the portion of the non-binauralized input
sound signal reproduced by the external loudspeaker comprises a select portion of the audible frequency
spectrum of the non-binauralized input sound signal.

26. (Original) The method of Claim 25, wherein the select portion of the audible frequency
spectrum of the non-binauralized input sound signal includes low frequency tones.

27. (Original) The method of Claim 15, wherein the non-binauralized input sound signal is
a monaural sound signal.

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28. (Original) The method of Claim 15, wherein the non-binauralized input sound signal is a stereo sound signal.

29. (Original) The method of Claim 15, wherein the non-binauralized input sound signal is a surround sound signal.

30. (Original) The method of Claim 15, wherein the input sound signal is a binaural sound signal.

31. (Previously Presented) The method of Claim 15, wherein the step of processing comprises the step of:

changing attributes of the signals representing the non-binauralized input sound signals, the attributes selected from the group including intensity, phase and signal delay with respect to the corresponding original non-binauralized input sound signal and/or with respect to another non-binauralized input sound signal.

32. (Previously Presented) The method of Claim 15, wherein the perceived virtual locations of the sound signals do not vary with movement of the listener's head in the azimuthal plane at the listening position.

33. (Currently Amended) A method for real time virtual positioning of a sound signal in three dimensional space as perceived during playback with respect to a plurality of listening positions, comprising the steps of:

inputting a stereo audio signal from a video program prerecorded to include surround sound audio;

decoding the surround sound audio to provide a plurality of surround sound signals;

processing the plurality of surround sound signals to position each of them as virtual locations disposed in an azimuthal plane with respect to a central listening position;

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repositioning in real time select ones of the plurality of surround sound signals in virtual
10 locations to apparent positions above and below the azimuthal plane ~~to maintain constant virtual
distances between the listening position and each of the plurality of virtual locations, responsive to
movement of the listening position, such that the perceived virtual locations of the sound signals do not
vary with movement of the listening position;~~

mixing the plurality of surround sound signals representing virtual locations including
15 repositioned select ones of the plurality of surround sound signals in virtual locations to provide a
binauralized output including a left output signal and a right output signal;

playing the left and right output signals through respective left and right localized
loudspeakers of localized speaker headsets at the plurality of listening positions, wherein the left and
right output signals provides a sound source at each of the plurality of listening positions appearing to
20 have a constant virtual distance between the central listening position and each of the plurality of virtual
locations; and

wherein the perceived virtual locations of the sound signals do not vary with movement
of a listener's head in the azimuthal plane at each of the plurality of the listening position: positions.

34. (Canceled)

35. (Previously Presented) The method of Claim 33, wherein the step of processing said
plurality of surround sound signals comprises the steps of:

selecting portions of each channel of the surround sound signal;

blending the selected portions according to a predetermined mixing plan to generate a
5 composite sound signal; and

coupling the composite signal to an external loudspeaker.

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36. (Original) The method of Claim 33, wherein the step of playing comprises the steps of:
supporting the left and right localized loudspeakers proximately in the plane of the
zygomatic arch of the listener in rearward facing relationship with respect to the listener's head for
radiating sound toward the pinna of the listener's respective left and right ears; and
5 coupling the left and right output signals to corresponding left and right signal inputs of
the left and right localized loudspeakers.

37. (Original) The method of Claim 36, wherein the step of supporting comprises the step
of:
locating the left and right localized loudspeakers proximate and not in contact with the
respective left and right ears of the listener so as to avoid disturbing the conch resonance of the listener's
5 ears.

38. (Original) The method of Claim 36, wherein the step of supporting comprises the step
of:
locating the left and right localized loudspeakers proximate and not in contact with the
respective left and right ears of the listener such that the natural left-right and right-left separation of
5 signals by the listener's head is maintained.

39. (Original) The method of Claim 33, comprising the step of:
associating the video program image with the stereo audio signal.

40. (Original) The method of Claim 39 comprising the steps of:
associating an external loudspeaker with the video image;
positioning the external loudspeaker proximate the video image and facing in the same
direction as a line of sight from the central portion of the video image to the listener; and
5 reproducing a portion of the stereo audio signal in the external loudspeaker.

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41. (Original) The method of Claim 40, wherein the step of reproducing comprises the steps of:

selecting portions of each channel of the stereo audio signal;

blending the selected portions according to a predetermined mixing plan to generate a composite sound signal; and

coupling the composite sound signal to the external loudspeaker.

42. (Original) The method of Claim 40, wherein the portion of the stereo audio signal reproduced by the external loudspeaker comprises voice sounds.

43. (Original) The method of Claim 40, wherein the portion of the stereo audio signal reproduced by the external loudspeaker comprises a select portion of the audible frequency spectrum of the stereo audio signal.

44. (Original) The method of Claim 43, wherein the select portion of the audible frequency spectrum of the stereo audio signal includes low frequency tones.

45. (Previously Presented) The method of Claim 33, wherein the step of processing comprises the step of:

changing attributes of the signals representing the surround sound signals, the attributes selected from the group including intensity, phase and signal delay with respect to the corresponding original signal and/or with respect to another input sound source signal.

46. (Canceled)

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47. (Currently Amended) Apparatus for real time virtual positioning of a sound source in three dimensional space as perceived during playback with respect to a plurality of listening positions, comprising:

means for processing a non-binauralized input sound signal representing the sound source to provide a plurality of sound signals, each representing the sound source, each of the plurality of sound signals corresponding to one of a plurality of virtual locations disposed in an azimuthal plane with respect to a central listening positioning;

means ~~in real time~~ for repositioning select ones of said plurality of the sound signals corresponding to the virtual locations to apparent positions above and below said azimuthal plane to maintain constant virtual distances between the listening position and each of the plurality of virtual locations, responsive to movement of the listening position such that the perceived virtual locations of the sound signals, do not vary with movement of the listening position;

means for mixing said plurality of sound signals including repositioned select ones of said plurality of virtual locations, to provide a binauralized output including a left output signal and a right output signal; and

means for playing said left and right output signals through respective left and right loudspeakers of a localized speaker ~~headset at the listening position~~; headsets at the plurality of listening positions, wherein the left and right output signals provides a sound source at each of the plurality of listening positions appearing to have a constant virtual distance between the central listening position and each of the plurality of virtual locations.

48. (Canceled)

49. (Previously Presented) The apparatus of Claim 47, wherein said means for processing said non-binauralized input sound signal comprises:

means for selecting portions of each channel of said non-binauralized input sound signal;

means for blending said selected portions according to a predetermined mixing plan to generate a composite sound signal; and

means for coupling said composite signal to an external loudspeaker.

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50. (Original) The apparatus of Claim 47, wherein the means for playing comprises:
means for supporting said left and right loudspeakers proximately in the plane of the
zygomatic arch of a listener in rearward facing relationship with respect to said listener's head for
radiating sound toward the pinna of said listener's respective left and right ears; and
5 means for coupling said left and right output signals to corresponding left and right signal
inputs of said localized speaker headset.

51. (Original) The apparatus of Claim 47, comprising:
means for associating a video image with said non-binauralized input sound signal.

52. (Original) The apparatus of Claim 51, wherein said means for associating a video image
comprises:
an external loudspeaker for association with said video image;
means for positioning said external loudspeaker proximate said video image and facing
5 in the same direction as a line of sight from the central portion of said video image to said listener; and
means for reproducing a portion of said non-binauralized input sound signal in said
external loudspeaker.

53. (Original) The apparatus of Claim 52, wherein said means for reproducing comprises:
means for selecting portions of each channel of said non-binauralized input sound signal;
means for blending said selected portions according to a predetermined mixing plan to
generate a composite sound signal; and
5 coupling said composite sound signal to said external loudspeaker.

54. (Currently Amended) Apparatus for real time virtual positioning of a sound source in
three dimensional space as perceived during playback with respect to a plurality of listening positions,
comprising:
means for inputting a stereo audio signal from a video program prerecorded to include
5 surround sound audio;

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means for decoding said surround sound audio to provide a plurality of surround sound signals;

means for processing said plurality of surround sound signals to position each of them as virtual locations disposed in an azimuthal plane with respect to a central listening position;

10 means for repositioning in real time select ones of said plurality of surround sound signals in virtual locations to apparent positions above and below said azimuthal plane to maintain constant virtual distances between the listening position and each of the plurality of virtual locations, responsive to movement of the listening position such that the perceived virtual locations of the sound signals, do not vary with movement of the listening position;

15 means for mixing said plurality of surround sound signals representing said virtual locations including repositioned select ones of said plurality of surround sound signals in virtual locations to provide a binauralized output including said left output signal and said right output signal; and

20 means for playing said left and right output signals through respective left and right localized loudspeakers at the plurality of listening positions, wherein the left and right output signals provides a sound source at each of the plurality of listening positions appearing to have a constant virtual distance between the central listening position and each of the plurality of virtual locations.

55. (Canceled)

56. (Previously Presented) The apparatus of Claim 54, wherein said means for processing said plurality of surround sound signals comprises:

means for selecting portions of each channel of said surround sound signal;

5 means for blending said selected portions according to a predetermined mixing plan to generate a composite sound signal; and

means for coupling said composite signal to an external loudspeaker.

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57. (Original) The apparatus of Claim 54, comprising:

means for supporting said left and right localized loudspeakers proximately in the plane of the zygomatic arch of a listener in rearward facing relationship with respect to said listener's head for radiating sound toward the pinna of said listener's respective left and right ears; and

5 means for coupling said left and right output signals to corresponding left and right signal inputs of said left and right localized loudspeakers.

58. (Original) The apparatus of Claim 54, comprising:

means for associating a video image of said video program with said stereo audio signal.

59. (Original) The apparatus of Claim 58, wherein said means for associating said video image comprises:

associating an external loudspeaker with said video image;

5 positioning said external loudspeaker proximate said video image and facing in the same direction as a line of sight from the central portion of said video image to a listener; and

reproducing a portion of said stereo audio signal in said external loudspeaker.

60. (Original) The apparatus of Claim 59, wherein said means for reproducing comprises:

means for selecting portions of each channel of said stereo audio signal;

means for blending said selected portions according to a predetermined mixing plan to generate a composite sound signal; and

5 coupling said composite sound signal to said external loudspeaker.

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